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5th International Dry Toilet Conference

Title of abstract: Dry Toilets Contribute in Safe Food Facilities among Poor Households

Author's name and affiliations: Md. Azahar Ali Pramanik,
Executive Director,
Society for People's Action in Change and Equity (SPACE)

Contact name: Pramanik

Postal address: SPACE, House No. 745 (1st Floor), Baitul Aman Housing Society, Adabor, Dhaka-1207, Bangladesh

E-mail address: azahar.pramanik.space@gmail.com

Telephone and / or Skype: [Tel:+88-02-9138772](tel:+88-02-9138772), Cell: +88-01713453100, Skype: azahar.space



Autobiography of Author: Md. Azahar Ali Pramanik is a Bangladeshi by birth in 1st January of 1958. He has been working in Water Sanitation & Hygiene (WASH) programme since 27 years. Currently, he works as the founder Executive Director of SPACE, an up-growing WASH & to dry-toilet implementing NGO and dedicated in promotion of WASH and dry-toilets in Bangladesh. He is affiliated with few WASH networks at home and abroad. He obtained MSS degree in Social Work from Rajshahi University in 1983. He has attended and presented papers in several training courses, workshop and conference on WASH and environment at home and abroad.

Abstract

374 poor households occupied by 1063 men and women, 163 <5children and 6 physically challenged people of Bangpur village in Gomostapur Upazila of Chapainawabgonj district, locates in the semi-arid area of Bangladesh and Babupara, Noyapara and Ailmara villages of Bandarban Hill district badly suffered from food crisis in lack of water during dry seasons.

Excessive use of chemical fertilizers and synthetic pesticides badly contributes in hiking food price, degrading soil quality and water holding capacity. Due to lack of relevant studies, there is no accurate data on the bad impacts of utilizing chemical fertilizers and synthetic pesticides. Field experience reveals that food cost has increased more than 80% in compare to 7-8 years correlated with price hike of fertilizers, pesticides and cost of irrigation. Experience shows tha 100 kg chemical fertilizers and 250 gm insecticides were sufficient for one hector farmland before 10 years. Maximum irrigation cost was around 20 Euros (1500BDT). The same quantity of farmlands now needs 300 kg chemical fertilizers, 1000 gm pesticides and irrigation costs increased at Euro 45 Euros. The increasing costs are around triple, which contributes in increasing food costs. The poor people are the victims of increasing price of foods as they cannot afford. Consequently, starving, consuming lower quantities and qualities of foods led them into various health risks.

SPACE, a local NGO, facilitated the poor people with innovative initiatives including installation of 48 dry toilets for water conserving and reuse of treated human urine and feces as organic fertilizers in farm, 48 vermi-compost units for converting kitchen wastes into organic fertilizers and water saving washing mechanism for utensil cleaning along with reuse of waste water in small farming. SPACE also facilitated in social preparation to the people through awareness and hygiene promotion activities, training for safe handling and application of treated human and kitchen wastes in agriculture. SPACE also imparted human value-based WASH education to target people for water saving utilization and use of rainwater for drinking and other domestic purposes during rainy seasons.

Field findings reveal 100% households use, clean and manage urine and feces for recycling, 100% households recycle kitchen wastes by vermi-composting, 97% families practice water saving wash using ash and small water and reuse waste water in agricultural fields after recycling. 100% families save water using dry toilets. Field reports further reveal that 100% households produce various vegetables and fruits using recycled wastes, safely and hygienically handled those for applying in

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firming. As results, they got more yields utilizing organic fertilizers produced human and kitchen wastes; production cost reduced more than half and they can produce vegetables year-round using treated human urine, feces and household wastes as organic fertilizers. Field reports further indicate that 87% women are involved in small farming and produce food crops; 96% families have chemical free fresh adequate foods round the year. 100% of them know ways in securing health and foods utilizing their own resources. Remaining people of the same and neighboring areas come to see and show interests in accepting the mechanism.

Keywords: Food Crisis; Malnutrition; Organic Fertilizers; Small Farming; Adequate Foods;;

Introduction:

Being posited upon the Ganges Delta, Bangladesh is highly vulnerable to natural disasters. These natural disasters cause severe damage to life, socioeconomic condition and to the raising crops in the farmland. However, Bangladesh has made enough progress to increase farm production to ensure food for her people in the recent days. Rice production has been tripled in the last 40 years to feed the nation with significant increase in vegetables, fish and fruit production. However access to food for the poor people, and utilization of food to achieve nutrition security are still necessary to bring sustainability. Because, per capita calorie intake, child malnutrition and population undernourished are still unsatisfactory. In Bangladesh, 36% children are still suffering from malnutrition, 41 children per 1000 die due to least access to nutrition, around 17% people are still remain in under-nutrition level. Additionally, shrinking land from agricultural production for infrastructure development, climate change, natural disasters, less initiative to diversify crop production can treat food solvency into a pitfall. Along the above causes, heavy usages of chemical fertilizer to augment crop yield and tendency to increase net benefit have long term effect to food security. Because, pesticides and synthetic fertilizers decrease the water level in the field, changes the soil-microbes interrelation, and increases marginal diminishing returns in the long run. Nevertheless, inducing chemical fertilizers in the field increases price of goods in all levels from production to consumption including residual effect of using pesticides on fruits and vegetables.

Semi-arid zone of Bangladesh locates in the North-western part covering around 40% country lands and hill tract areas covers around 11% where drought is a natural phenomenon for eight-nine months in a year. Average temperature in these areas is 35°C- 42°C during extremely dry season. Annual rainfall is 1200 mm-1500 mm which is lower than national average. Effects of Climate Change cause irregular rainfall that aggravating droughts. Semi-arid areas may be divided into three categories: i) Low-dry areas covered by mostly plain lands, dry season starts earlier and shallow-wells do not work; ii) Dry areas covered by contour lands and Deep-Set pumps do not work; iii) extremely dry areas covered by higher lands, dry season comes earlier and existing water pumps do not work.

Rapid population growths along with modifications of the landforms in Semi-arid and Hill Tracts have been degrading the biophysical environment. The climatic condition in this region has changed. There is very little rainfall and the weather remains hot by the daytime but becomes cooler by late night. Since rainwater is the main source of groundwater recharge in this area, the climatic change that disfavours abundant precipitation has adversely affected the groundwater recharge system. The withdrawal of more groundwater than its recharge causes the successive lowering of the groundwater table of the Barind region. These phenomena have eventually been greatly affecting the environmental parameters and if it persists the environment of the Barind Tract will become rather unfavourable for habitation in the near future. Besides lowering of the water table another noticeable change is the decrease in forest area. According to some reports from the British colonial times about 42% area of this Tract was covered by forests in early 19th century. Statistical reports of the land survey since 1849

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showed that forests covered about 55% of the Barind lands. But by 1974, about 70% land of the region had been changed into cultivable land.

It also badly affects in producing food crops as water is the most essential ingredient of farming. During the dry seasons, almost all the poor people intake less amount of foods and water which lead them, especially, the children and the women into malnourished. By adopting chemical fertilizer, food security could be vulnerable to much extent considering price and ecological aspects. Field experience reveals that food cost in Bangladesh has increased more than 80% compared to last decades and there is a strong correlation with price hike of fertilizers, pesticides and cost of irrigation. It is also noteworthy that one hectors farmland needed 100 kg chemical fertilizers and 250 gm synthetic pesticides and 1500BDT for irrigation purpose during last decade. Compared to previous figure, the same area of lands need 300 kg chemical fertilizers, 1000 gm pesticides and 3500BDT since recent years. This price hike is challenging for the poor farmer families to afford food because producing crops for own families and purchasing other commodities are not comparable to the net benefit by selling their products from their marginal farmland. Thus, it results in starving for them consuming lower quantities and qualities of foods led them into various health risks.

Eco-friendly manure and fertilizers along with improving nutrition status in farmers can make an alternative to chemical fertilizer and pesticides and ensure food security for the long term in Bangladesh as it the farmers frequently suffer from crisis of fertilizers. Having access to ecological friendly manure can lead to farmers bring solutions in many dimensions for improved farming and productivity. For example: efficient use of urine and feces manure and vermi compost can not only fulfill the demands fertilizer requirement for farmland; but also recycle waste, increase hygiene in the family and create shield to communicable disease in the family in the finer scale. In the broad sense, it can also ensure food safety for marginal small and landless families by omitting price for the chemical fertilizers in the farm because poor families cannot always afford money to buy synthetic pesticides and fertilizers to grow crops for them. Recent improvement in the ecological dry toilet could be an ideal alternative to answer many problems among the small scale farming families in Bangladesh and improve their living status. Because improving WASH facilities among poor families not only progress nutrition status but also an alternative source of manure and fertilizers to reduce cost in the farming so that it can increase food security against poverty.

Methodology:

This paper has been prepared on the basis of information collected from the implementation of EcoSan toilets in various geographical situations. Different field level reports e.g. progress reports, monitoring reports, case study and few publications were selected and considered as the main base of Literature review. A field study was conducted to address the need to fill the information gap noticed during literature review; to have people's perception on dry toilets promoted by SAPCE. The field study was carried in the project areas of SAPCE located in semi-arid zones, Hill Tract areas and plain land areas. In this purpose, observation methods, Focus Group Discussion, interviewing with the dry toilets users and non users were carried out. During field visits, impacts of dry toilets in respect to social, economic and environmental aspects were observed. However, a project has been carried out among 48 households in Sadar Upazila of Chapainawabgonj district, located in the semi-arid area of Bangladesh. Primarily, the vulnerability of these families was assessed in terms of food safety and WASH situation and substansive research findings were utilized to improve food security among those households. To fill the gaps, this study incorporate household surveys among family members, assessed their need and impacts of project implementation. It also envisages, whether this model could be replicable to other part of Bangladesh as an unique solution to improve both WASH and food safety.

Initial problems and ways of overcoming the problems:

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Being the majority of population in the project areas are Muslim and some religious literature condemns the reuse of excreta in Muslim society. Keeping the issues as the major points in mind, the dry toilet users first denied for reusing human urines and faeces in plantation and food production. Besides, the cultural barriers of reusing human excreta in productive activities, especially in plantation and food production appeared as one the strongest factors of hindering the acceptability. Using human excreta in plantation and productive activities were disgraceful and insulting to them as they never imagined. Besides, human excreta were regarded as an offensive and unpleasant word to them and it was a taboo among them in handling. Some of the conservatives took chance for misinterpreting the project works and misguided the community to be excluded from the project. Many of target people were found fecophobic and badly reacted with disgusted attitude in using human excreta in agriculture. It was somehow very challenging at the initial stage in implementing the project activities, stated that people were unwilling for discussing the reuse of human excreta and demonstrated discomfort through their gestures.

However, conducting local culture-fitted awareness activities through popular theatre, demonstration of benefits of reusing human excreta in farm fields, organizing spot visits to the demonstration farm-plots by target communities, conducting campaigns, involving community and religious leaders, school children, keeping close and frequent contact with the target households, it was possible for bringing about expected solution of the problems.

Implementation approach and strategies:

SPACE, the implementing agency, undertook multi-dimensional strategies for the implementation of dry-toilet project. Out of those, assessing the community needs through participatory situational analysis, demand creation for dry-toilets among target communities implementing suitable awareness activities, strengthening capacities of target communities, ensuring effective community participation etc. In addition to these, project also provided safety-net support to the poor households; ensuring quality construction of the dry-toilets through necessary monitoring during the construction period, imparting use, operation and maintenance training (O&M) to ensure expected use, O&M and excreta management; focusing to sustainability etc. The project also conducted close monitoring followed by the phaseout strategies and then phasing out.

Besides the technical installation of different devices, SPACE also facilitated in social preparation to the people through awareness and hygiene promotion activities, training for safe handling and application of treated human and kitchen wastes in agriculture. SPACE also stretched human value-based WASH education to target people for water saving utilization and use of rainwater for drinking and other domestic purposes during rainy seasons.

Results:

Field findings reveals that 100% of the dry toilets were in good condition and no damage was found there. SPACE collected necessary data on different aspects of the dry toilets and interaction of the users. Data revealed 100% households recycled human excreta along with kitchen wastes for composting and had used those in organic farming. It was also found the target households efficiently followed techniques of human excreta management, recycling those and applying in farm-fields. It contributed them in saving money from buying chemical fertilizer and synthetic pesticides. It further contributed in one way in saving human health and environment while it also contributed in reducing food price in the locality and making available food facilities at doorsteps of the target people. Field reports further revealed that 100% households produced various kinds vegetables and fruits in both homeyards and farms using recycled wastes. SPACE also considered whether people handled these recycled wastes safely and hygienically in farming. Treated with these manure instead of commercial fertilizer, data unfolded that beneficiaries got more yields utilizing these organic fertilizers produced human and kitchen wastes.

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Considering substitute to commercial fertilizers and pesticides to grow crops, farmers needed alternative sources to minimize production cost which was fulfilled by organic manure and fertilizers. Getting by products as organic manure and vermicompost made a parallel source of nutrients to the farms and helped farmers not only in production cost but also family maintenance. Production cost reduced more than half and they could produce vegetables year-round using treated human urine, feces and household wastes as organic fertilizers. Field reports again indicate that 87% women were involved in small farming and produced food crops while 96% households got access to residual and preservative free fresh vegetables and fruits round the year in the project areas.

Aiming to improve knowledge about of sound health and how to maintain good life, the monitoring team also observed qualitative indicators about practicing hygiene and disease free environment. 95% people progressed to improve the learning and they could buffer some contagious and seasonal disease which were prevalent before the project. 100% of them know ways in securing health and foods utilizing their own resources. Most of the family members including children are now observing a better life by this project and through an indirect interview, the team also found that it created awareness to the neighbour as better practice.

Discussion:

In the south-east Asia, Bangladesh has made significant progress in MDGs. Despite vulnerability from climate change and adaptation challenge to natural disasters, nation needs more socio-economic sustainability for the middle and low income groups in different sectors. Such an initiative can uphold development of Bangladesh and make a better hope to take challenges in the future which will be unpredictable at this moment. Like other developing nations, Bangladesh also needs food safety and such a safety could come from farm production to homestead gardening. Because of the homestead gardening to harvest vegetables and fruits to meet nutritional demand of small rural families is common in Bangladesh. An alternative to commercial fertilizer to produce manure for the home-yard vegetable and fruit production could be sustainable in terms of recycling and reuse through innovative technology. Such a paradigm was considered in this project by helping 48 rural poor families in north-western Bangladesh with an objective to improve their family economy, food safety in small scale, and increase access to quality WASH.

SPACE, being a WASH specialist NGO, took this challenge by installing ecological dry toilets among poor farmer's households in Bangladesh to different circumstances. Through increasing awareness, it also became successful to make change in practice for WASH and improve family health. The outcomes were enumerative and this social and ecological mechanism could be considered to replicate to other places of Bangladesh to meet primary development agenda.

Due to economic development, agricultural land is decreasing rapidly day by day in Bangladesh. While food safety is increasing in Bangladesh, food vulnerability is also evolving. For example, frequent natural disasters for global warming can decrease food production. Thus finding alternatives like dry toilet could strengthen safety issues with smart choice for the rural people in Bangladesh. Settling in the weather poor areas and continuing life bring miseries. These 48 families represent such weather poor condition because this part of Bangladesh is very dry except monsoon season and scarcity of water is prevalent for both farm production and homestead necessity. So to produce food, to maintain family and bring quality in life, our team identified a nexus among many factors including poverty, climate, WASH, and education which is ultimately making vulnerable food security.

Like many other rural households, the project beneficiaries are very poor and their daily income was not more than 3 US\$ in a day. Installing dry toilets, target beneficiaries translated low income into income and underdevelopment into eco-friendly development. Once very poor unhygienic condition is now turned into hygienic condition by these dry toilets through multifaceted use. Comparing conventional toilets, dry toilets are increasing demand in rural areas because of a number of competitive utilities, for example: less water demand, easy to use, eco friendly, waste recycling

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capacity and creation of by product manure. Among 48 families, it was possible to make dry toilet a success because these people were suffering from safe defecation without any toilet facility. In the family and social context, people only change behavior when cause and effect becomes effective and coherent. Such a process was found among the target group as they accepted dry toilets as new technology. From our project it has been found that conventional toilets could not outcompete with dry toilets by 100% usage of dry toilets among the families. In Bangladesh, social and religious view in terms of family WASH of the rural people is very strong and accepting new technology for family use sometimes remains impossible. However active contribution by project and technology on demand made this a success to install a single dry toilet unit per family. Through active awareness program and training people showed cleanliness which increased better immunity for the family and less disease susceptibility. People used urine and feces as alternative to commercial fertilizers for homestead fruit and vegetable production and it contributed to save their family spending and increased per family food safety.

Conclusion:

Bangladesh is one of the poorest countries in the world and many of its poor farmers and low income people cannot maintain minimum requirement for life. For producing rice and other food, the people of Bangladesh have to depend on moderate annual flooding during the summer monsoon season and maintain soil fertility in the delta basin. In the north-west part of Bangladesh, seasonal food scarcity for poor people is still paper-news due to lag agricultural season, crop damage, vulnerability to natural disasters and low impact project initiative by government. Nevertheless, economic and social stratification have exacerbated poor people's life despite Bangladesh has recently showed excellent figures in many parameters of Millennium Development Goals (MDGs). Disease prevalence among lower income group in Bangladesh is enveloped with other factors of life, for example: food safety, poverty, and education. In this case, successful intervention addressed poor people to think about quality WASH and how to become healthy quality of life. However, behavioral change in people is very tough and without practice, it lessens. In this context, how quickly people stop practicing WASH with adequate knowledge would be interesting to study in the future.

However, national economy of Bangladesh mainly depends upon agriculture and 63% of its land is used for agricultural purposes. 74% people live in rural areas while 63% of them are engaged in agricultural farming. Farmers use excessive synthetic fertilizers and synthetic pesticides to the crops for more yields to meet increasing demands of the rapidly growing population. EcoSan toilets offer easy solution of the problems and can effectively contribute in safely transforming human urines and faces into high-potent organic fertilizers for eco-friendly agriculture and producing qualitative nutrient food-crops. Human excreta can associated with household wastes can produce energies for lighting and cooking purposes. However, Bangladesh produces seven million metric tons of human feces and 70 million metric tons of urine each year which can contribute in reducing environmental hazards, saving national economy, improving quality and safe foods. The world leaders can rethink and adopt the issues with their nationadevelopment startegies.

Case Study-1

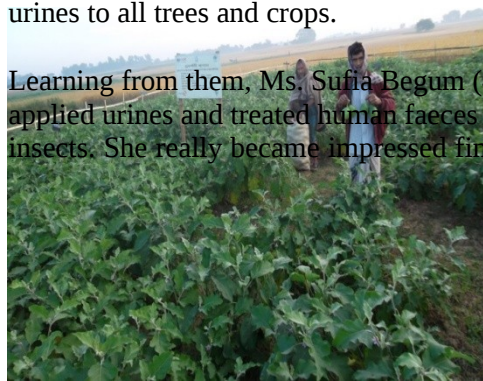
Unique Effects of urines

My wood apple tree was about dead and my mind set left her thinking that it would die and nothing was there to recovery her. Mr. Shahjahan, Field Facilitator of SPACE suggested me for urine use to the wood apple tree. He also suggested us how to use urines at what frequencies. We followed his suggestion for using urines what we stored at our Eco-toilet supported by SPACE. We found after about three months that the wood apple tree was recovering gradually it took another two months for full recovery. It was really magical and out of imagination. After this experience, we have using urines to our all wood and fruit trees and corps. We are getting more benefits and easy solutions for fertilizers, which is available with us, costs and chemical free, good for human and environmental health. It only needs self and social acceptance and a wide recognition by all along with the government. I recommend to all to use urines as I am doing". Ms. Tajkera Begum (47) wife of Mr. Abu-Bakar Siddique of Amarak village under Nawabgonj Sadar Upazila (Sub-district) in Nawabgonj district (a North-Western district of Bangladesh) was sharing her experience on urine use.



The Nawabgonj district is located under the semi-arid region of Bangladesh. It is one of the water scares areas, where underground water declines badly during dry seasons. When Tajkera Begum found her wood apple tree was going to die, she thought because of water scare, of dry seasons and she did not have anything to do. The tree recovered during the dry season when she used urines. Now she along with her family members and neighbors enjoys wood-apple. She also sells additional wood apples which contributes her family to earn some extra money. Now, she use to encourage the neighbors for using urines to trees and crops for healthy trees nutritious and chemical-free fruits and foods. Learning from that practical experience of Tajkera, Ms. Farida Begum (29), wife of Mr. Golap Hossain of the same village started using urines to her about to dying jack fruit tree. Having tremendous results to the recovery of the jack fruit tree, she along with her husband widely use urines to all trees and crops.

Learning from them, Ms. Sufia Begum (43) wife of Mr. Hossain Ali, a poor farmer, of the same village applied urines and treated human faeces (generated from dry toilet) at her eggplant field for protecting insects. She really became impressed finding the fact that there were no more insects in the eggplants.



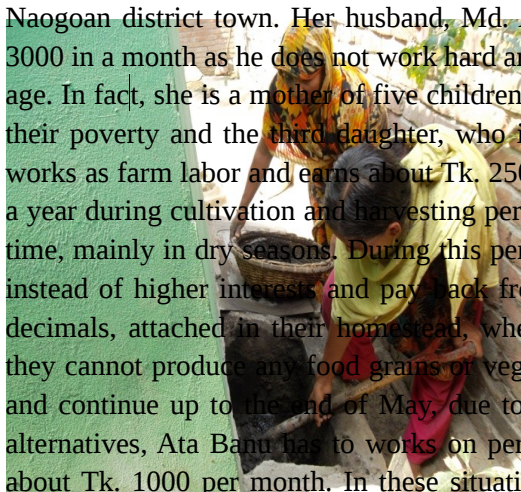
Once she had suffered much from the attack of insects to her eggplant since the last couple of years. She used chemical fertilizers and insecticides to the eggplants; but got no results. She spent lot of money for insecticides and chemical fertilizers; but did not get expected results. Repeated financial loss and damaging the crops, her poverty level became more aggravated. After using the treated urines and feces in crop field, she did not have to buy any fertilizer and pesticides from market that contributed her in saving money and decreasing production costs. Last year, Ms. Sufia earned a neat income of Tk. 34700 (Equivalent to 400 euro) from her small farm lands (About 25 decimiles) The organic vegetables are also found with good tastes. Now, almost all households of Amarak village have Eco-toilets at their house and about 80% of them use treated urines and feces for crop production.

Case Study-2

Eco-toilet and Waste management, a hope for better living

Ms. Ata Banu, a housewife of 38 years old, lives with her three children along with her husband at **Bazinapukur** village under **Ghatvog** union of **Porsha** Upazial in **Naogaon** district since about 23 years back after her marriage. The village locates in the west at a distance of about 45 kilometers from Naogaon district town. Her husband, Md. Abdul Manan (49) is a farm labor earns about Tk. 2500-3000 in a month as he does not work hard and continue all the days in a week due to his illness and old age. In fact, she is a mother of five children and two her daughters have been married at early age due their poverty and the third daughter, who is about 10 years old lives with them. Her elder son also works as farm labor and earns about Tk. 2500 per month. They can only work for about 7-8 months in a year during cultivation and harvesting periods, and remain unemployed for about 4-5 months rest of time, mainly in dry seasons. During this period of unemployment, her family has to lend money from instead of higher interests and pay back from their low income. They have a small land, around 10 decimals, attached in their homestead, where they cultivate some paddy during rainy seasons. But, they cannot produce any food grains or vegetable during dry seasons, beginning almost from January and continue up to the end of May, due to lack of water and required moister of lands. Finding no alternatives, Ata Banu has to works on part-time basis at nearby houses from where she could earn about Tk. 1000 per month. In these situations, Ata Banu has to manage her family shouldering the curse of extreme poverty.

A **SPACE** Field Facilitator had come to her and shared about the Eco-toilet supports funded by **Bangladesh NGO Foundation**. He also shared the socio-economic, health and environmental benefits of Eco- toilet and vermin-composting. Learning all the things from the Field Facilitator, she became interested and shared the idea to her husband. Her husband became also convinced for installing those for better sanitation and income generation. Managing the cost-sharing money about Tk. 3500 with so many troubles, she installed an EcoSan toilet inside of her household boundary and very close to her sleeping room. Having users training and other capacity building supports, she started using human urines making a homestead garden near her house, where she planted sweet pumpkin, Ladies-fingers, spinach and other vegetables. After two times use urines produced from eco-toilet and organic fertilizers produced from household wastes, she observed dramatic changes of the plants what she never experienced before due to uneven dryness and drought in the area. People from neighborhood and neighboring families and villages came to see the vegetable gardens with curiosities.



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When they heard those vegetables were produced from human urines and organic fertilizers, became astonished looking the nutrient values and qualities of those. However, Ata Banu and her family felt



hesitation to consume the vegetables as those were produced from human urines. After that, they ate and got original tastes. For sharing her experience, she gave some vegetables to her neighbors who also got the same tastes and experience. Now, the villagers become interested and buy vegetables from her gardens. This year, she sold vegetable to the neighboring families and in the Bazar. From selling, she earned Tk. 7360 (Equivalent to 850 Euro) and she did not buy any vegetable from market. Her husband and children are happy now to get the product and are planning to scale up vegetable gardens around their homestead and lending lands from the neighbors.

Using the money, she has repaid loans, managing cost of her family and schooling of her younger son and daughter. She thinks that she will not be continuing of her part-time maid servant job to other's households and be fully involved in homestead gardening. Now, she encourages her neighbors and villagers to do the same for reducing use of chemical fertilizers, reducing food cost, self-reliant in food safety and security along with keeping healthy environment and combating effects of climate change in the Barind Tract Areas. Taking learning from Ata Banu, 16 families from Bazinapukur and Borogram villages under Ghatnagar union have already started homestead vegetable gardens using urines and vermin-compost.